UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
760 South Broadway
Salina, KS 67401-4642
Phone: 785-823-4500
FAX: 785-823-4540
www.ks.nrcs.usda.gov

August 2002

KANSAS AGRONOMY TECHNICAL NOTE KS-42

Operation and Maintenance
Filter Strip

Filter strips are designed to fail. If they function properly, they will fill with sediment and/or contaminants losing their effectiveness. Therefore, filter strips require regular maintenance. Filter strips on flatter grades below higher sediment sources will require more frequent and more extensive maintenance than those on steeper grades receiving less sediment.

OPERATION AND MAINTENANCE

- Mow (and harvest if possible) filter strip plantings, as needed, to encourage dense vegetation growth.
- Time mowing or harvest so that robust, upright vegetation of 6- to 8-inch height is present during the expected runoff events.
- Control undesirable weed species.
- Inspect after each storm event to determine if repair is warranted.
- Gullies should be repaired to eliminate concentrated flow. (See photos and directions below.)
- Remove flow-disrupting accumulations of sediment. Immediate and careful removal of sediment will not require reseeding of the filter strip grasses. (See photos and directions below.)
- Install other measures, as needed, to prevent concentrated flow within the filter strip. (Examples include: level berms, spreader ditches, and vegetative barriers.)
- Exclude livestock and vehicular traffic from the filter strip during wet soil conditions to maintain infiltration rates within the filter strip.
- The final tillage operation should not be made parallel to the filter strip to ensure that runoff from the adjacent field flows onto the filter strip.
- Restoration is required once the filter strip has accumulated so much sediment that it is no longer effective.

Summary

Filter strips can provide an effective "final cleanup" to field runoff before it enters a water body or drainageway. They do not work as a stand alone practice. They must be part of a system that reduces upland erosion and runoff. Filter strips require regular monitoring and maintenance. Single intense storms or runoff events can damage a filter strip sufficiently to require immediate repair. A properly maintained conservation system with filter strips can provide additional benefits of wildlife cover and forage production.

Figures on the following pages illustrate filter strips functioning at different levels of effectiveness. Suggested maintenance for each situation is discussed.

Figure 1 depicts sediment that was initially deposited after a wind erosion event and subsequently reworked by water. The **field** was eroding at rates higher than appropriate for long term effectiveness of the filter strip. A wide assortment of conservation practices, such as conservation tillage, rotations, windbreaks, herbaceous wind barriers, cross wind trap strips, to name a few, would greatly reduce sediment entering the filter strip. The **field/filter strip edge** effectively initiated sedimentation into the filter strip. (The grass of this filter strip was functioning as a cross wind trap strip during the wind erosion event.) **Sediment deposit # 1** was initially deposited by wind within 20 to 30 feet of the edge of the filter strip. A later runoff event eroded the wind deposited sediment and carried some of it farther into the filter strip and deposited it as **sediment deposit # 2**.

Sediment deposit #1 should be removed as soon as possible in order to restore the filtering function of the filter strip. This deposit has effectively converted uniform sheet flow to multiple concentrated flows. The concentrated flows carry sediment and disolved contaminants further into and through the filter strip. If **sediment deposit # 1** is removed within three growing season weeks of deposition, scrapers or maintainers can be used to remove the material down to the previous soil surface for redistribution back into the field. Removing the sediment soon after depostion while not cutting more than 1 to 2 inches into the old soil surface means the site should not require reseeding. Rhizomes remaining in the area of sediment removal should initiate sod formation.

Sediment deposit # 2 will not need immediate removal, but could be removed while equipment is removing **sediment deposit #1**.

Warning: Erosion events moving this amount of sediment this far into the filter strip indicates a filter strip situation that will require frequent repairs and have a high probability of failure.

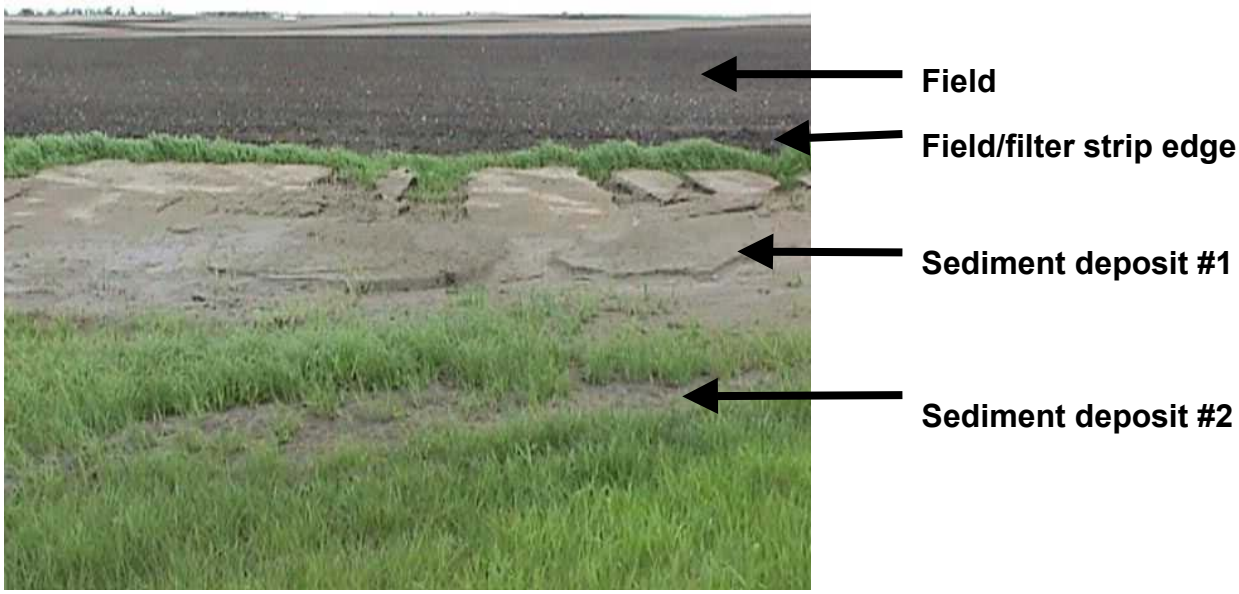

Figure 1

Figure 2 illustrates the damage that can result from high levels of sheet erosion combined with **concentrated flows**. This filter strip is non functional. The filter strip is unable to handle the **concentrated flow** of water and **sediment** coming from the field or flowing parallel to the edge of the filter strip. Filter strip management must begin by controlling the **sediment** originating in the **field**. Potential sheet erosion control practices within the **field** could be crop rotation, conservation tillage, contour buffer strips, or contour strip cropping. Adequate sheet erosion control and improved soil tilth may or may not remove the need for grassed waterways or vegetative barriers to control **concentrated flows**. At the field/filter strip edge, a **vegetative barrier, level berm, spreader ditch**, or **water bars** may be needed to change **concentrated flow** to sheet flow. At least one of these water spreading devices may be needed whether the waterway is constructed or not.

Note: It is very difficult to take **concentrated flow**, from all but the smallest drainages, and convert it to sheet flow with just vegetation. For instance, waterways often function at a runoff rate of 4 feet per second (25 seconds to cross 100 feet while a filter strip requires that the water take 15 to 30 minutes to flow through 100 feet). Generally**, concentrated flow** from only the smallest waterways can be converted to sheet flow and effectively treated within normal filter strip widths.

The accumulated **sediment** should be removed as soon as possible to restore filtering capability and prevent the need to reseed parts of the filter strip. Note: If runoff from the field reaches the filter strip as sheet flow, then a healthy upright **vegetative barrier** at the field/filter strip edge will cause water to temporarily pond in the field and much of the **sedimen**t to deposit outside the filter strip, similar to the situation illustrated in Figure 3. **Sediment** deposition outside the filter strip extends the life of the filter strip and keeps the nutrient rich soil in the field where it can be farmed.

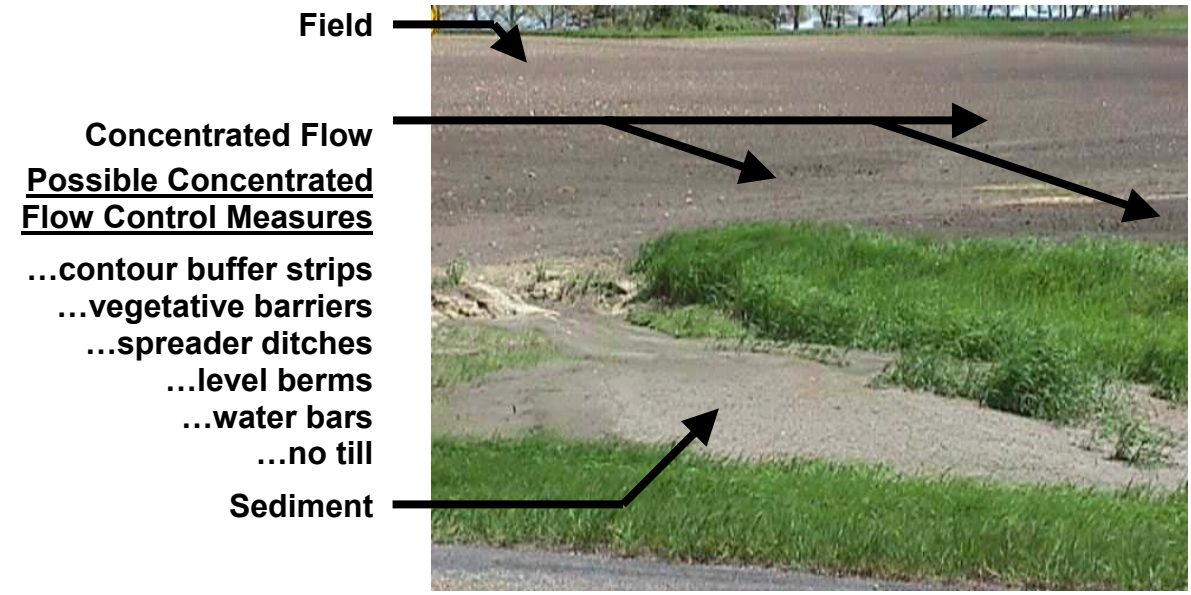

Figure 2

Figure 3 illustrates a filter strip overwhelmed by excessive **sheet and rill erosion**. Soil losses from a single event occurring on this field are approaching 100 tons/acre/year. The **field/filter strip edge** is acting like a vegetative barrier, causing some of the sediment (**sediment deposit #3**) to be dumped in the field. Since the filter strip is so narrow, much of the sediment delivered to the filter strip flows through the filter to be deposited in the **wetland**. A small amount is trapped as **sediment deposit #4**. In this particular situation, removal of **sediment deposit #4** is not needed at this time.

In fact, as long as vigorous upright vegetation can be maintained at the **field/filter strip edge, sediment deposit #3** will deepen and widen, improving the sediment trapping efficiency at the field edge. This process will continue working only as long as no concentrated flows are allowed to develop across the filter strip and the filter strip grass is allowed to expand and widen onto the accumulated sediment in the field.

However, **sheet and rill erosion** control measures such as crop rotations, contouring, contour buffer strips, field borders, vegetative barriers, contour strip cropping, conservation tillage, or no till are needed on the cropland to reduce soil losses! Without upland erosion control, this filter strip is unlikely to provide long-term sediment control or water quality improvement. Even with the large amount of sediment trapped in **sediment deposit #3**, water quality was still negatively impacted.

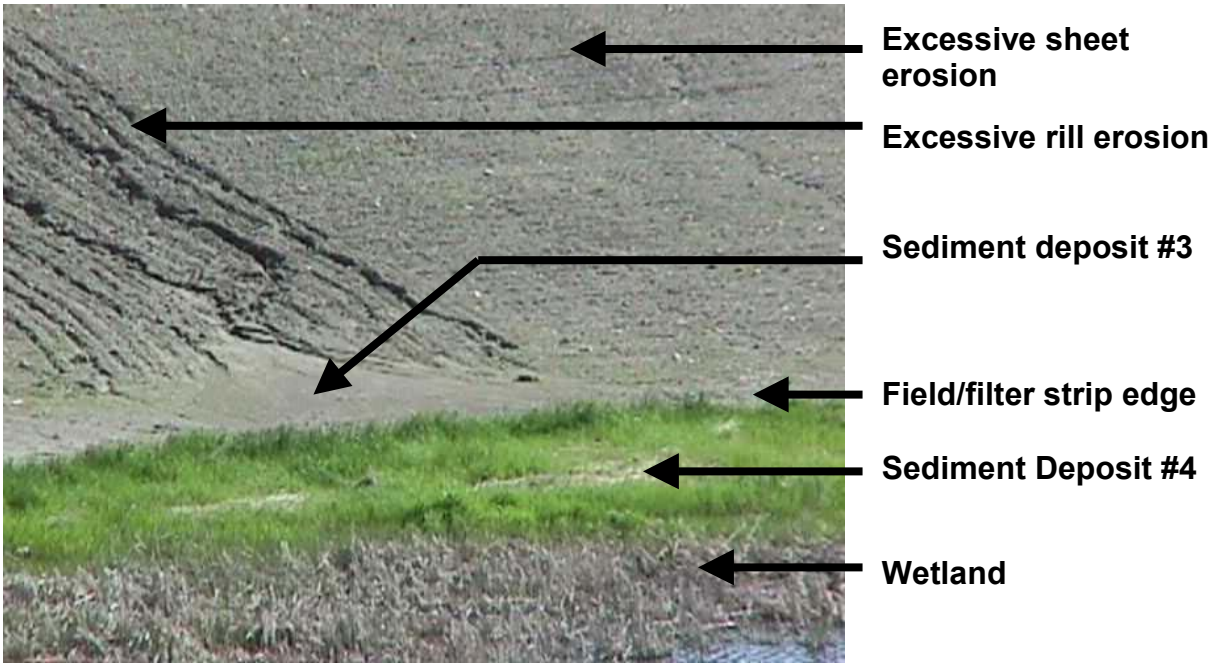

Figure 3

Research shows that though 60 to 80 percent of the total sediment may be trapped near the edge of a filter strip, 40 to 60 percent of the contaminants flow farther into, or through, a filter strip attached to the smaller-sized soil particles.

This filter strip should also be widened according to the filter strip design flow length chart in the General Specifications for Filter Strips, Section IV, Field Office Technical Guide. Greater widths are needed to adsorb dissolved contaminants, even with adequate erosion control on the field. Without erosion control on the field, much wider widths and continuous maintenance will be needed to trap just a portion of the sediment and contaminants.